

We claim:

1. A microfluidic device for delivering a drug to an individual, comprising:
a reservoir for receiving the drug therein;
5 an output needle having an input in communication with the reservoir and an
output receivable within the individual; and
a pressure source engageable with the reservoir for urging the drug from the
reservoir through the output needle.
- 10 2. The microfluidic device of claim 1 further comprising a flexible membrane
isolating the pressure source from the reservoir.
3. The microfluidic device of claim 1 further comprising a valve operatively
connecting the input of the output needle and the reservoir.
- 15 4. The microfluidic device of claim 3 wherein the valve defines a chamber
having an input communicating with the reservoir and an output communicating with the
input of the output needle.
- 20 5. The microfluidic device of claim 4 wherein the valve includes:
a flexible membrane for dividing the chamber into a first drug flow portion and a
second trigger receiving portion; and
a trigger disposed in the trigger receiving portion in the chamber of the valve and
having a first configuration preventing the flow of the drug through the chamber and a
25 second configuration allowing the flow of the drug through the chamber.
6. The microfluidic device of claim 5 further comprising a first sensing needle
having an input receivable in the individual and an output within the trigger receiving
portion of the chamber, the first sensing needle allowing physiological fluids to pass from
30 the individual to the trigger receiving portion of the chamber.

7. The microfluidic device of claim 6 further comprising a second sensing needle having an input receivable in the individual and an output within the trigger receiving portion of the chamber, the second sensing needle allowing physiological fluids to pass from the individual to the trigger receiving portion of the chamber.

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8. The microfluidic device of claim 6 wherein the trigger includes a hydrogel post, the hydrogel post expandable in response to exposure to a predetermined condition.

9. The microfluidic device of claim 1 further comprising:
10 a second reservoir for receiving a bolus of the drug therein; and
an actuation device movable between a non-actuated position and an actuated position wherein the bolus of the drug is urged through the outlet needle and into the individual.

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10. A microfluidic device for delivering a drug to an individual, comprising:
a body defining a reservoir for receiving the drug therein and a conduit, the
conduit having an input communicating with the reservoir and an output;
an output needle having an input receiveable in the body to communicate with the
5 output of the conduit and an output extending outside of the body for insertion into the
individual; and
a pressure source engageable with the reservoir for urging the drug from the
reservoir through the output needle.
- 10 11. The microfluidic device of claim 10 wherein the output needle is removable
from the body.
12. The microfluidic device of claim 10 further comprising a flexible membrane
isolating the pressure source from the reservoir.
- 15 13. The microfluidic device of claim 10 wherein the conduit includes a valve for
controlling the flow of the drug from the reservoir to the output needle, the valve defining
a valve chamber and being movable between a non-actuated position wherein the valve
prevents the flow of the drug from the reservoir to the output needle and an actuated
20 position wherein the valve allows for the flow of the drug from the reservoir to the output
needle.
14. The microfluidic device of claim 13 wherein the valve includes:
a flexible membrane for dividing the valve chamber into a first drug flow portion
25 and a second trigger receiving portion; and
a trigger disposed in the trigger receiving portion of the valve chamber and having
a first configuration with the valve in the non-actuated position and a second
configuration with the valve in the actuated position.

15. The microfluidic device of claim 14 further comprising a first sensing needle having an input receiveable in the individual and an output within the trigger receiving portion of the valve chamber, the first sensing needle allowing physiological fluids to pass from the individual to the trigger receiving portion of the valve chamber.

16. The microfluidic device of claim 15 wherein the trigger includes a hydrogel post, the hydrogel post changing configuration in response to exposure to a predetermined condition in the physiological fluids.

17. The microfluidic device of claim 10 wherein the body defines a second reservoir for receiving a bolus of the drug therein; and wherein the microfluidic device further comprises an actuation device movable between a non-actuated position and an actuated position wherein the bolus of the drug is urged through the outlet needle and into the individual.

18. A microfluidic device for delivering a drug to an individual, comprising:
a body defining a reservoir for receiving the drug;
an output needle having an input in communication with the reservoir and an
output receivable within the individual; and
5 an adhesive for affixing the body to the individual.

19. The microfluidic of claim 18 further comprising a pressure source engageable
with the reservoir for urging the drug from the reservoir through the output needle.

10 20. The microfluidic device of claim 18 further comprising a docking station for
supporting the output needle, the docking station being removably connected to the body.

21. The microfluidic device of claim 18 further comprising a valve defining a
chamber and interconnecting the reservoir and the output needle, the valve movable
15 between a non-actuated position wherein the valve prevents the flow of the drug from the
reservoir to the output needle and an actuated position wherein the valve allows for the
flow of the drug from the reservoir to the output needle

22. The microfluidic device of claim 21 wherein the valve includes:
20 a flexible membrane for dividing the valve chamber into a first drug flow portion
and a second trigger receiving portion; and
a trigger positioned within the trigger receiving portion of the valve chamber and
having a first configuration with the valve in the non-actuated position and a second
configuration with the valve in the actuated position.

25 23. The microfluidic device of claim 22 further comprising a first sensing needle
having an input receivable in the individual and an output within the trigger receiving
portion of the valve chamber, the first sensing needle allowing physiological fluids to
pass from the individual to the trigger receiving portion of the valve chamber.

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24. The microfluidic device of claim 23 wherein the trigger includes a hydrogel post, the hydrogel post changing configuration in response to exposure to a predetermine condition in the physiological fluids.

- 5 25. The microfluidic device of claim 10 wherein the body defines a second reservoir for receiving a bolus of the drug therein; and wherein the microfluidic device further comprises an actuation device movable between a non-actuated position and an actuated position wherein the bolus of the drug is urged through the output needle and into the individual.

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